Neighbor effects on Adoption of Conservation Agriculture in Nicaragua

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Background

- Rural development projects promote interventions to trigger the adoption of agricultural technologies.
- Interaction with neighbours likely to influence take up of project interventions.
- Few impact evaluations estimate “between” program effects.
- We take advantage of exogenous variation on exposure to estimate neighbour effects from a project that promoted conservation agriculture technologies in Nicaragua.

Background

- Exogenous variation on exposure has been used by :
  - Miguel and Kremer (2004): cross school deworming.
    - Number of treated schools at distance D.
  - Bobba and Gignoux (2014): cross village school participation.
    - Number of treated villages at distance D.
    - Program density at distance D.
  - Prassan (2015): cross village labor allocation and wages.
    - Ratio of treated over untreated bordering neighbors.
- We add to this literature evaluating an agricultural development project using similar methods in a different context.

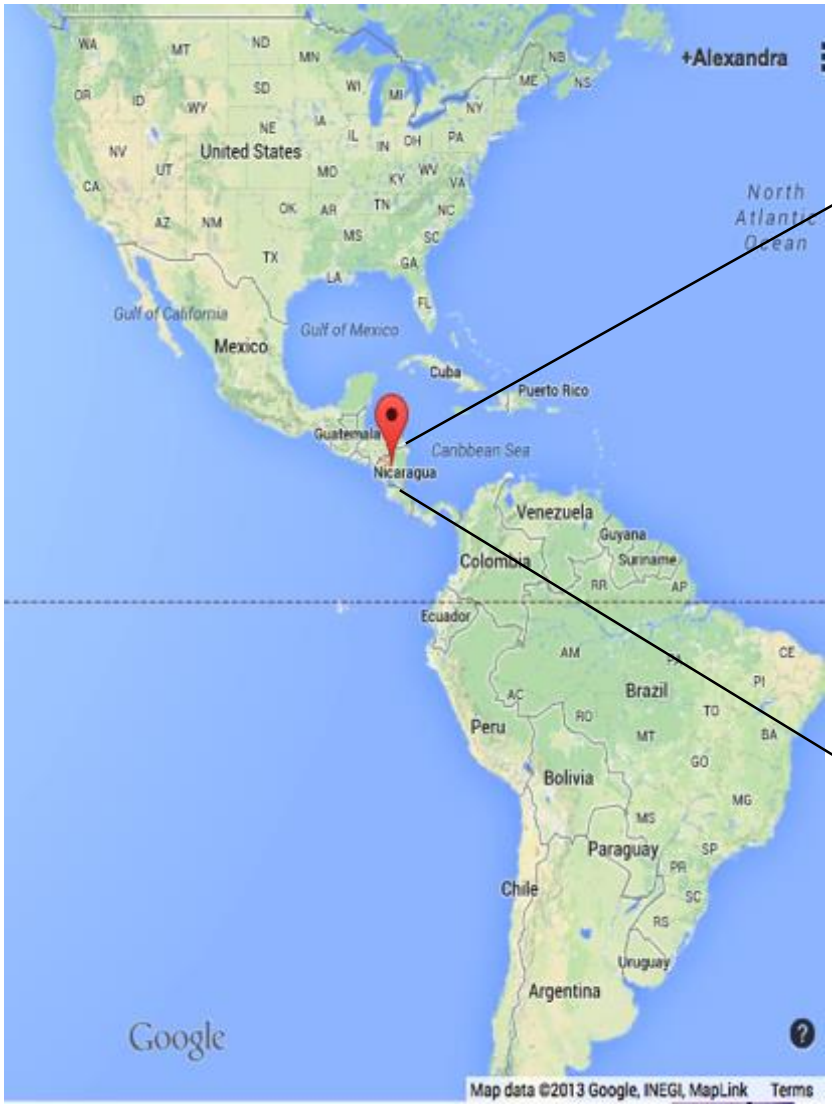
Agriculture for Basic Needs (A4N) project in Nicaragua

- A4N was a three year Rural development project implemented by the NGO Catholic Relief Services.

- Project interventions:
  - Targeted at the poor.
  - Farmers offered a package of multiple interventions.
  - Treatment at the village level.

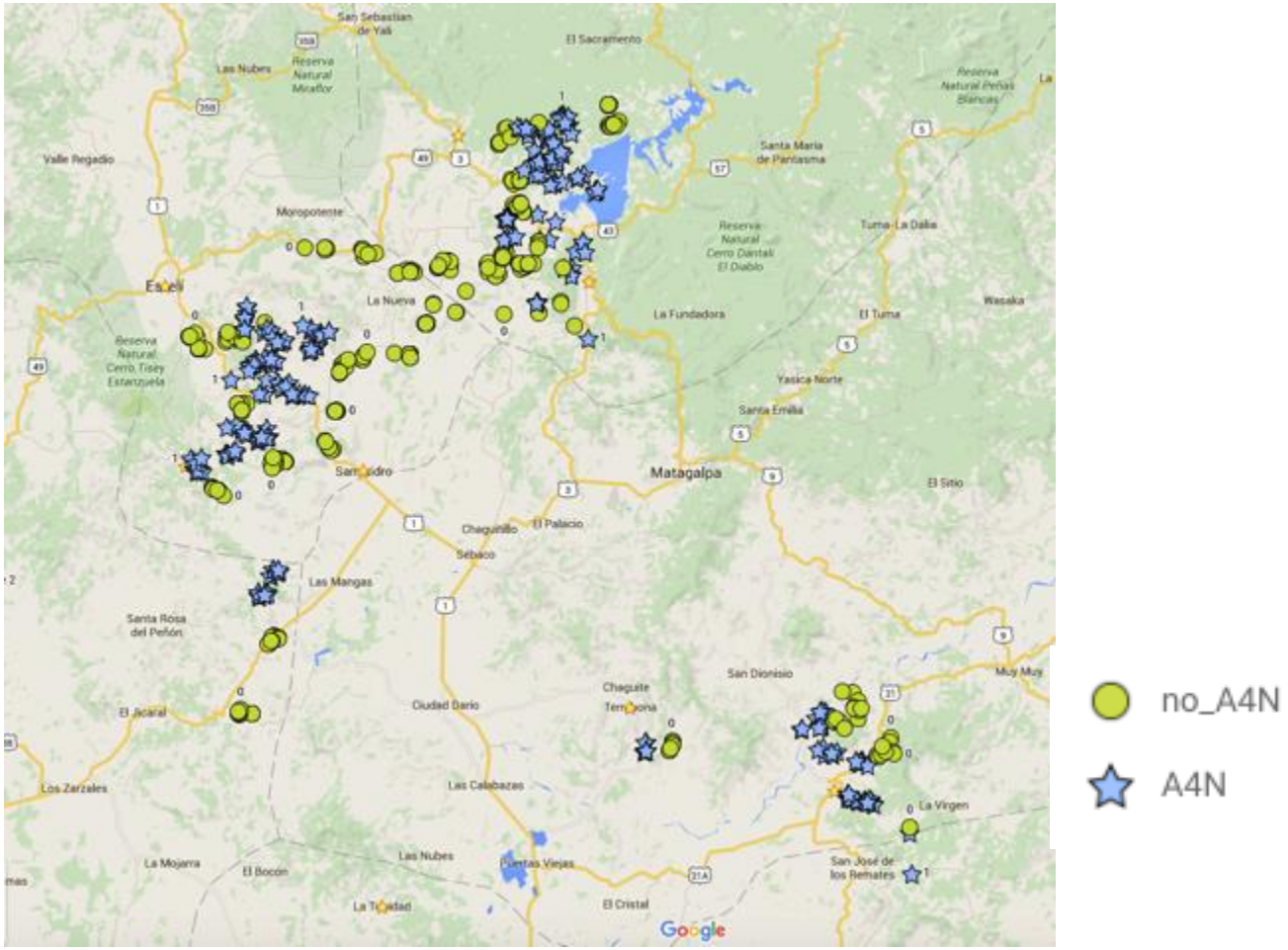
Agriculture for Basic Needs (A4N) project in Nicaragua

Study site



Second poorest country of LAC.
Low agricultural productivity..
Soil degradation, slash and burn agriculture.
Vulnerability to natural disaster.

Treatment and control households



Source: A4N 2009, 2011 survey, Google maps

Data

- Two rounds: 2009 and 2011.
- Sampling design:
  - Treatment (A4N) villages: 30 (of 44 in A4N)
    - 10 households per village: 284 treatment
  - Control villages: 31 (40 from 2005 population Census)
    - 10 to 15 households per village: 294 control
  - N=576
- Location of villages using GPS coordinates.

Methods and empirical strategy

- Difference in difference estimation:

$$\Delta y_{it} = a + t\,A4N + d\sum_{j=1}^{m} A4N\_V_{jd} + g\sum_{j=1}^{m} A4N\_N_{jd} + b\Delta x_{it} + \Delta u_{it}$$

Where:
i indexes households, t indexes time, m number of neighbors, d indexes distance.

y_{it}: Outcome variable (continuous and binary).
$\boldsymbol{x}_{it}$: household size, average years of education, area of cultivated land, proportion of land annual crops, value of agricultural assets.

A4N:	Binary treatment variable, A4N=1.
$A4N\_V_{id}$:	Number of treated villages j, within distance d of household i.
$A4N\_N_{id}$:	Number of eligible households in treated villages j within distance d of household i.

Structures(length of built structure per area of land): effects significant but small

	Conserv ag structures m/Mz			Stone barriers m/Mz			Live barriers m/Mz		
A4N	77**	70*	78*	25*	22*	25*	15**	14*	16*
Treated Vill 0-2 Km		9*			4*			1	
Treated Vill 2-5 Km		-0.05			0.6*			0.01	
Eligible No. 0-2 Km			1			0			-1
Eligible No. 2-5 Km			-2			1			2
Covariates	YES	YES	YES	YES	YES	YES	YES	YES	YES

Standard errors cluster at the village level.
Mz stands for Manzana 1Mz=0.7 Hectares

Practices (proportion of adopters) : effects significant but small

	Zero tillage			Cover crops		
A4N	0.20**	0.26***	0.26***	0.03***	0.05***	0.02**
Treated Vill 0-2 Km		0.01			0	
Treated Vill 2-5 Km		0			0	
Eligible No. 0-2 Km			0.08*			0.007*
Eligible No. 2-5 Km			0			0
Covariates	YES	YES	YES	YES	YES	YES

Standard errors cluster at the village level.

Conclusion

- Neighbor effects matter for structures, density of exposure matters for practices.
- Effect vanishes with distance.
- Probably capturing an implementation/project design effect. Villages seem to be clustered and that resulted in interactions between households in different villages.
- Small effects expected after 2 years of project implementation, and due to the characteristics of the technology promoted.
- Ignoring neighbor effects can lead to under estimation of program effects.

Thank you.

Questions?